Canadian Patent Office

602,572
Issued Aug. 2, 1960

Patent No. 602,572

Sweetening Agents

Hilard L. Krevitz, Los Angeles, California, U.S.A.

Application August 26, 1957, Serial No. 735,294
In the United States August 27, 1956
15 Claims—No drawing

The present invention relates to sweetening agents and more particularly to novel sweetening materials to be employed as sugar substitutes by diabetics or by those desiring to eliminate or minimize the use of sugar for the purpose of weight control or otherwise.

Sugar substitutes are being utilized in every increasing quantities by the consuming public, not only by diabetics but even more by those who most regulate their caloric intake either under doctor's orders or voluntarily.

The most commonly used sugar substitute is saccharin which, however, possesses disadvantages in itself. In the first place, the sweetening power of saccharin is so great that it must be diluted with inert materials, with the result that the final product consumed by the individual contains a relatively small concentration of sweetener in a nonsweet diluent of great bulk. For this reason the taste sensation is diminished or not perceived in the same manner as in the case with sugar.

In addition, there is considerable variability among individuals in their response to these highly diluted artificial sweeteners so that the results obtained are not entirely uniform. Certain of these artificial sweenteners, of which saccharin may be taken as the prime example, will give a bitter aftertaste which is unpleasant to certain individuals particularly as the degree of concentration of the sweetening agent is raised to effective levels.

Another disadvantage of artificial sweetening agents such as saccharin is that their use does not appear to satisfy or appease the craving for sweets by those accustomed to them so that apart from the matter of palatability, satisfaction of this intangible hunger does not result from the use of saccharin and other similar materials.

In general, saccharin and the like must be dispensed in solution or in tablet form, whereas there is considerable need for a granular sweetening agent of the type under consideration, which looks, feels and tastes like sugar, and yet possesses a satisfactory degree of palatability along with little or no caloric value.

In accordance with the present invention, applicant has discovered that relatively small proportions of artifical sweetening agents may be incorporated with a base composition comprising glycine (aminoacetic acid), with the result that the mixture will eliminate many of the disadvantages of the prior art compositions, and will at the same time provide certain definite and positive advantages. The advantages possessed by the novel composition referred to may be enumerated as follows:

(1) Glycine as the base composition has a negligible caloric content by comparison with sucrose having a caloric value of approximately four calories per gram. Medical evidence indicates that glycine is not completely metabolized to produce its full caloric value. It has been indicated that glycine is utilized in the body in the synthesis of other more complex compounds such as hormones or that it becomes attached to other end products of metabolism without itself becoming metabolized.

Glycine is unique in this respect, due to the simplicity of its structure and its ready utilization in the body. For this reason glycine is particularly well adapted to serve as a base for the incorporation of artificial sweetening agents since it provides a background material which is itself sweet to the taste but is completely digested or utilized in the body without supplying any significant number of calories.

(2) Glycine is sweet to the taste, being approximately 70% as sweet as sugar, and therefore it imparts a background taste sensation to the artificial sweetening agent, with the result that the immediate taste effect is that of sweetness, to which is added the sweetening power of the artificial sweetening agent. The composite effect upon the taster is similar to and approaches that produced by tasting ordinary table sugar.

(3) The bitterness detected by some observers in tasting saccharin or other artificial sweeteners is absent, apparently due, at least in part, to the dispersion of the sweetness on the glycine particles and the blending effect of the sweet base material.

(4) The glycine-containing compounds can be formulated to provide a product having an appearance and mouth feel which is similar to that of sugar. This refers to the crystalline appearance of the compounds, their ready solubility in water and foods, and to their whiteness. This is largely due to the fact that glycine possesses a crystalline structure which is compatible with crystals of saccharin and other sweetening agents. Therefore, the particle size of the ingredients of the compound can be regulated to any desired extent.

(5) Glycine is harmless and completely digestible since it is an amino acid.

(6) Since the composition can be formulated as a powder or granular mixture it can be dispensed or utilized by shaking or spreading on foods or can be mixed and incorporated in foods in the same manner as sugar.

(7) Since the glycine is sweet in itself it contributes to the sweetening power of the mixture.

(8) The mixture is readily soluble in water and liquid food products in all normal concentrations.

(9) The glycine mixture does not contain carbohydrates which are generally interdicted when artificial sweeteners are required in the diet.

(10) The mixture of glycine and saccharin and of glycine and other artificial sweeteners appears to produce an additive or synergistic effect over and above what might be expected from the combined sweetening power of the glycine plus the sweetening power of the artificial sweetener.

(11) The glycine composition is quite stable and may be stored for long periods of time. These compositions are not adversely affected by heating during cooking.

In general, it has been found desirable to admix the glycine and the artificial sweetener with substantial proportions of a diluent. The diluent utilized should desirably be readily soluble in water and where a granular composition is desired the diluent should also be of a granular or crystalline nature so that the uniform compatible mixtures may be obtained. A preferred diluent is gum arabic, which possesses the above-mentioned desired properties. Other diluents may be utilized if desired and may include other soluble and edible compounds such as gum karaya and the like. Other well-known edible

materials may also be utilized such as calcium lactate, calcium gluconate or the like. For granular compositions for general table use a mixture of glycine, sweetener and diluent particles having a mesh size in the range of 60 to 100 has been found preferable. In addition to saccharin, other well-known artificial sweeteners include cyclamate and dulcin.

A preferred range of ingredients to provide a granular sugar-like mixture is as follows:

glycine — preferred range 25% to 99% by weight
— suitable range 5% to 99% " "

saccharin — preferred range 1% to 5% by weight
— suitable range 0.05% to 20% "

diluent (gum arabic or the like) — as desired, but generally in the range of 1% to 80% by weight

Where the saccharin is replaced in whole or in part by other artificial sweeteners such as cyclamate, adjustments must be made in the proportions of such materials to allow for the difference in sweetening power. Generally, greater proportions are required since saccharin has greater sweetening capacity than other materials.

The following examples illustrate typical formulations of the composition of this invention:

Example I

Saccharin	3% by weight
Gum arabic	37% " "
Glycine	60% " "

Example II

Cyclamate	8% by weight
Gum arabic	40% " "
Glycine	40% " "
Calcium lactate	12% " "

Example III

Cyclamate	2% by weight
Gum arabic	35% " "
Glycine	52% " "
Calcium lactate	10% " "
Saccharin	1% " "

Panel tests conducted by applicant upon numerous subjects indicate that at least one in every four individuals will detect a disagreeable bitter taste when using saccharin in normal concentrations in beverages. This is borne out by similar taste tests reported in the Journal of the American Pharmaceutical Association, Scientific Edition, Vol. XLIV No. 7, July 1955, pages 442-447. By the use of applicant's novel combination utilizing glycine with saccharin as described in Example I above, panel tests indicate that not more than one person in twenty-five will detect any bitterness in beverages utilizing the novel sweetening combination. Such a result is indicative of a high degree of consumer acceptance, particularly since it is generally recognized that even using sucrose controls, a small percentage of individuals will report positive results in such tests due to suggestibility of the individual or other psychological factors. Due to the difficulty in measuring or evaluating test results, which are dependent on so many variables and intangible factors, such tests can only be considered as indicative of a general trend or result which is clearly demonstrated in tests conducted with the above-mentioned combinations.

While saccharin is a preferred artificial sweetening agent due to its high sweetening capacity and low cost, other sweetening agents such as cyclamate or dulcin, as described above, may be utilized in place of saccharin or in mixtures therewith. Since such other sweetening agents have a lower sweetening capacity than saccharin, larger portions must be utilized in order to achieve a desired level of sweetness. Cyclamate is sodium cyclohexylsulfamate. Other soluble salts of N-cyclohexyl sulfamic acid are also effective. These compounds are described in United States patent No. 2,275,125. Dulcin is also known as sucrol or parophenetolcarbamide. Saccharin, as referred to herein, includes not only saccharin itself, but its alkali metal and alkaline earth metal salts, the most commonly used of which is the sodium salt.

Formulations as described above, when compounded in granular mixtures with the particles having a mesh size in the preferred range of 60 to 100 mesh (U.S. Standard), have been found to be highly acceptable sweetening agents to be used in the same manner as granulated sugar. Such formulations have proved to occasion little or no objection from users on the score of bitterness and palatability and have also proved themselves to be considerably better than saccharin or cyclamate either alone or in blends.

The ability to prepare these formulations in granular form has been found to possess the further advantage that such granules, especially in the preferred mesh size, appear to prevent too rapid dissolution of the artificial sweetener, with the result that a more uniform sweetness is obtained.

The compositions of the invention as described above are especially adapted for use in granular form due to their physical and mechanical similarity to granulated sugar; however, these compounds may also be manufactured in solution or tablet form and in these have been found to possess the same advantages as the granular material with respect to lack of bitterness and the dietary advantages mentioned above. When used in solution, the diluent may generally be omitted; while in tablet form conventional binding agents as commonly used in the preparation of tablets may be advantageous.

The foregoing examples have been given as illustrations of the invention only. Many modifications may be made without departing from the scope of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A sweetening composition comprising glycine and an artificial sweetening agent.

2. A sweetening composition comprising glycine and an artificial sweetening agent selected from the class consisting of saccharin and its salts, N-cyclohexyl sulfamic acid and its salts, and dulcin.

3. A granular sweetening substance comprising glycine crystals admixed with a minor proportion of crystals of an artificial sweetening agent.

4. A granular sweetening substance according to claim 3 wherein the sweetening material is saccharin.

5. A sweetening material according to claim 3 wherein the sweetening material is cyclamate.

6. A sweetening material according to claim 3 wherein the sweetening agent is dulcin.

7. A sweetening material according to claim 6 wherein the sweetening agent is a mixture of saccharin and cyclamate.

8. In a sweetening composition in granular form comprising granules of glycine, saccharin and gum arabic.

9. A sweetening composition according to claim 7 wherein the size of the granules is in the range of 60 to 100 mesh.

10. A sweetening composition comprising from about

5

5% to 20% by weight of glycine, and about 0.05% by weight of saccharin.

11. A sweetening composition according to claim 10 wherein the mixture contains from about 1% to about 80% by weight of a water soluble edible diluent.

12. A sweetening compound according to claim 11 wherein the diluent is gum arabic.

13. A process for the improvement of the taste sensation of artificial sweetening agents without at the same time effecting any substantial increase in the caloric value of the composition which comprises admixing such artificial sweetening agent with glycine.

6

14. A process for the manufacture of an artificial sweetening composition having an improved taste sensation, no caloric value and free from carbohydrates which comprises admixing an artificial sweetening agent selected from the class consisting of saccharin, cyclamate, and dulcin with glycine.

15. A process according to claim 14 wherein the ingredients are admixed in powdered or granular form and utilized in such form to provide a granular non-caloric sweetener resembling sugar.

The Queen's Printer and Controller of Stationery, Ottawa, 1969